External Reference Frequency Multiplier PM 9697

03M10A49

Instruction Manual

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S&I
Scientific & Industrial Equipment Division

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Important
As the instrument is an electrical apparatus, it may be operated only by trained personnel. Maintenance and repairs may also be carried out only by qualified personnel.

Please note
In correspondance concerning this instrument, please quote the type number as given on the type plate.

The instrument is marked with this symbol when it is necessary for the user to refer to the manual.

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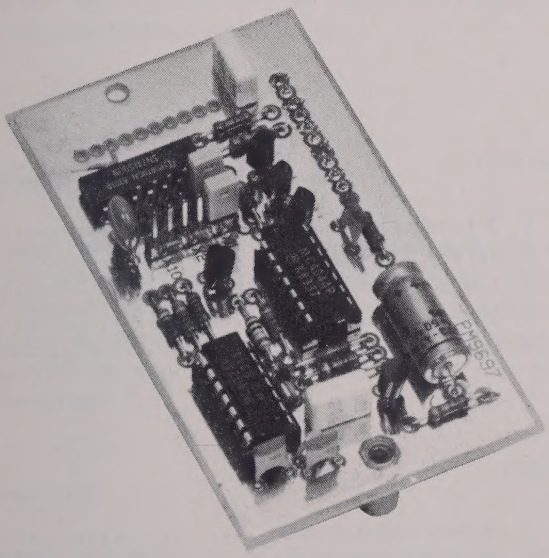
External Reference Frequency Multiplier PM 9697

Instruction Manual



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OPERATING PART

1. INTRODUCTION

With this option installed, the PM 6652, -54 and the PM 6670 series of counters can accept external reference frequencies of 1 MHz, 5 MHz or 10 MHz via input D (EXT STD IN) on the rear panel. The multiplier can however only be installed together with the standard X-tal oscillator (Version /01).

2. SAFETY INFORMATION

Read this page carefully before installation and use of the instrument. The instrument described in this manual is designed to be used by properly trained personnel only. Adjustment, installation of options or maintenance and repair of the exposed equipment shall be carried out only by qualified personnel who are aware of the hazard involved.

Safety precautions

For the correct and safe use of this instrument it is essential that both operating and servicing personnel follow generally-accepted safety procedures in addition to the safety precautions specified in this manual.

Impaired safety operation

Whenever it is likely that safe operation is impaired, the instrument must be made inoperative and secured against any unintended operation. The appropriate servicing authority must then be informed.

3. CHARACTERISTICS

Safety characteristics

This instrument has been designed and tested in accordance with safety Class I requirements of IEC publication 348, Safety Requirements for Electronic Measuring apparatus, and has been supplied in a safe condition. This manual contains information and warnings which must be followed to ensure safe operation and to retain the instrument in a safe condition.

Performance characteristics

Properties expressed in numerical values with stated tolerance are guaranteed by the Philips organisation in your country. Specified non tolerance numerical values indicate those that could be nominally expected from the mean of a range of identical instruments. This specification is valid after the instrument has warmed up for 15 minutes. (Reference temperature 25°C).

Input and output

Input frequency range:	1 MHz, 5 MHz or 10 MHz, jumper selected.
Deviation tolerance:	± 5% of selected frequency.
Output time jitter:	± 1 ns.
Power requirements:	Supplied by the counter.
Dimensions:	93 mm x 50 mm x 30 mm.
Weight:	50 g.
Environmental characteristics:	Same as for the counter.

Supplied accessories

Socket, screw, washer and identification label.

4. INSTALLATION

Opening of the cabinet

The counter must be disconnected from all voltage sources before it is opened. If adjustment or maintenance of the counter with the covers removed is inevitable, such maintenance must be carried out only by a qualified person.

NOTE: Opening of the cabinet or removing of parts, except those to which access can be gained by hand, is likely to expose live parts and accessible terminals that can be dangerous to life.

Installation in PM 6670...76

- Disconnect the mains cable.
- Remove the counters top and bottom cover.
- If necessary, remove any left solder in the 10 holes for mounting the socket, marked BU113 on the PCB.

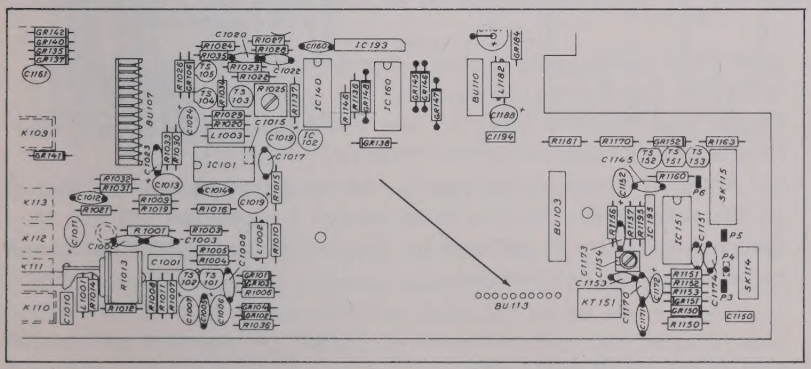


Fig. 4.1 Where to find BU113.

- Mount the supplied socket into the holes marked BU113 from the component side, see fig 4.1.
- Note, the crystal KT151 must remain installed in the counter because it is used as clock signal for the microcomputer.

- Solder the socket on the soldering side and cut the interconnection between pin 5 and 7 on the same connector. See fig. 4.2.
- Mount the PM 9697 circuit board so that the 10 pins of BU103 on PCB U1 runs through the corresponding holes in PM 9697.
- Secure the circuit board with the supplied screw and washer.

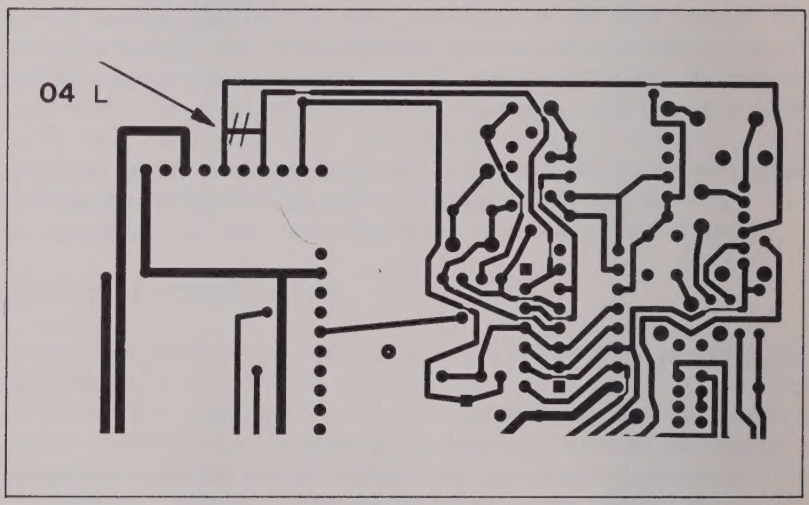


Fig. 4.2 Cut the interconnection between pin 5 and 7 of BU113.

- Select the multiplying factor according chapter "Operation".
- Refit the top and bottom cover of the counter.
- Attach the PM 9697 label to the rear panel, to indicate that this option is mounted in the counter.
- The external frequency reference can now be connected to input D on the rear panel. Set the slide switch to position EXT STD IN.
- When removing the PM 9697 option be sure to reconnect the interconnection that has been cut.

Installation in PM 6652, -54

- Disconnect the mains cable.
- Remove the counter's top and bottom cover.
- If necessary remove any left solder in the 10 holes located at right angel to the connector marked BU205.

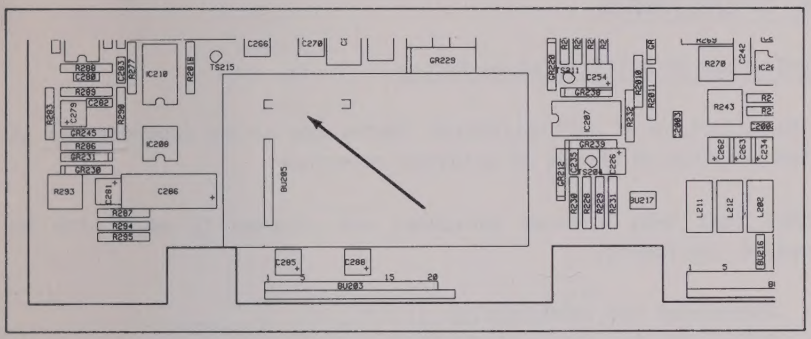


Fig. 4.3 Location for PM 9697 on board U2.

- Mount the supplied socket into the holes from the component side.
- Solder the socket on the soldering side and cut the trace interconnecting pin 5 and 7 on the same connector (see fig. 4.4).

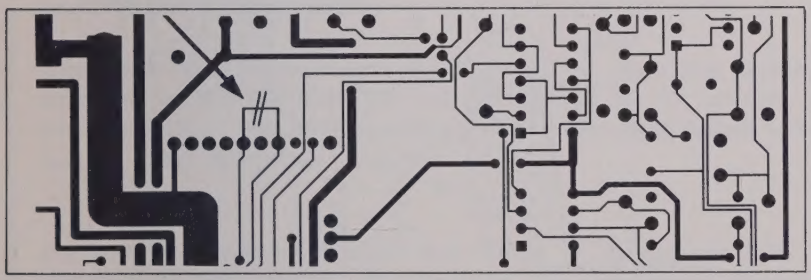


Fig. 4.4 Cut the interconnection between pin 5 and 7.

- Mount the PM 9697 circuit board so that the 10 pins of BU205 on PCB U2 runs through the corresponding hols in PM 9697.
- Secure the circuit board with the supplied screw and washer.
- Select the multiplying factor by mounting the two jumpers, see fig. 5.1.
- Refit the top and bottom cover of the counter.
- Attach the PM 9697 label to the rear panel, to indicate that this option is mounted in the counter.
- The external frequency reference can now be connected to input D on the rear panel. Set the slide switch to position EXT STD IN.
- When removing the PM 9697 option, be sure to reconnect the cut interconnection.

5. OPERATING

Selection of multiplication factor

The selection of multiplication factor has to be reconsidered at installation or change of external reference.

Note that only trained personnel are allowed to work with an opened instrument.

- Disconnect the mains cable.
- Remove the top cover of the counter.
- Find the two jumpers on PM 9697, see Fig. 5.1.

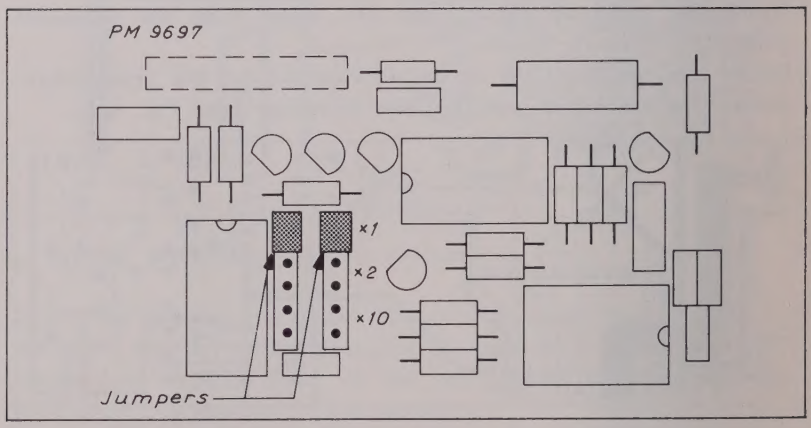


Fig. 5.1 Component layout PM 9697.

- Jumper positions:

External reference	Jumper position
1 MHz	x 10
5 MHz	x 2
10 MHz	x 1

- If necessary change the jumpers.
- Refit the cover.

SERVICE PART

6. SAFETY REGULATIONS

These servicing instructions are for use by qualified personnel only. To reduce the risk for electric shock, do not perform any servicing other than that specified in the operating manual unless you are fully qualified to do so.

The counter has been designed and tested in accordance with IEC publication 348, Safety Requirements For Electronic Measuring Apparatus for class 1 Instruments and has been supplied in a safe condition. This manual contains information and warnings that should be followed by the user and service technichan to ensure safe operation and repair in order to keep the counter in a safe condition.

Warning: The opening of covers or removal of parts, except those to which access can be gained by hand, is likely to expose live parts and accessible terminals which can be dangerous to life.

See also chapter "Safety Information".

7. FUNCTIONAL DESCRIPTION

Transistors TS101...103 converts the incomming ECL signal to TTL levels. IC102 and IC103 form a frequency and phase detector (PLL). The BU103 jumpers in the feed back loop sets the multiplying factor to 1, 5 or 10. The DC voltage at IC101:2 controls that the VCO in IC101 is oscillating at 10 MHz. Transistor TS105 change the TTL signal to ECL levels.

8. CHECKING

Recommended equipment

- Signal generator.
- 50 ohm termination.
- Power splitter.

Preparations

- The PM 9697 shall be mounted in the counter, (PM 6652, 54).
- Connect the signal generator via the power splitter to the A input of the counter and to the rear input EXT STD IN. Terminate the cable to the rear input with 50 ohm.
- Set the EXT CONTR switch to position OFF and select for input D EXT STD IN.
- Set the counter to: FREQ A, 50 ohm -A, KEYBOARD,
  MEASURING TIME = 1.9 s

Checking position X1

- Set the multiplier to position X1.
- Set the signal generator to 10.00 MHz and the level to 11 dBm (2.4 V_{pp}).
- The counter shall indicate:
  9.999 999 98 - 10.000 000 00 MHz for PM 6654 and
  10.000 000 MHz for PM 6652.

- Change the frequency to 9.97 MHz and check that the result remains within the same limits.
- Change the frequency to 10.03 MHz and check again that the result remains within the limits.

Checking position X2

- Set the multiplier to position X2 with the jumpers.
- Change the frequency from the generator to 4.98 MHz.
- Check that the counter indicates:
  4.999 999 98 - 5.000 000 00 MHz for PM 6654 and
  5.000 000 MHz for PM 6652.
- Change the frequency to 5.02 MHz and check that the counter remains within the same limits.

Checking position X10

- Set the multiplier to position X10 with the jumpers.
- Change the frequency to 0.997 MHz.
- Check that the counter indicates :
  0.999 999 98 - 1.000 000 00 MHz for PM 6654 and
  1.000 000 MHz for PM 6652.
- Change the frequency to 1.003 MHz, the indication shall still remain within the limits.

Restore the counter

- Set the jumpers according the actual need.
- Set the rear panel switch for input D to position INT (internal oscillator).

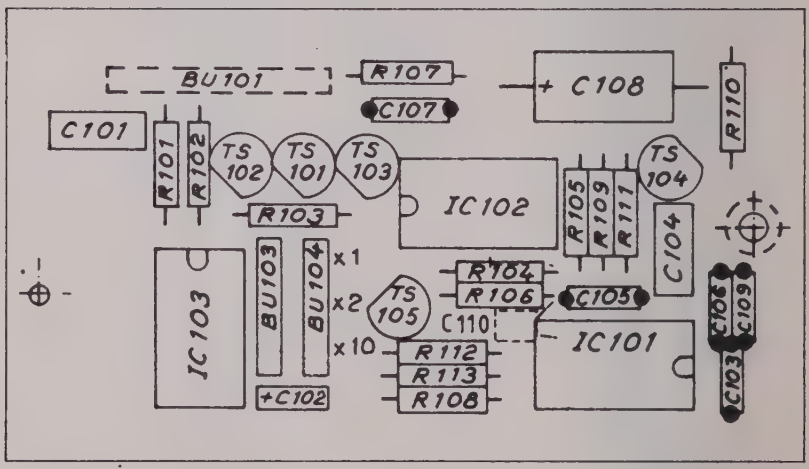
9. SPARE PARTS

Pos. No	Order No	Description		
BU1	5322 265 64028	Socket male		
BU103 104	5322 265 44057	Connector		
C101	4822 121 41672	Capacitor foil	100 nF ±10%	63 V
C102	5322 124 14066	Capacitor solid alu	10 µF ±20%	16 V
C103	4822 122 31414	Capacitor ceramic	10 nF	100 V
C104	4822 121 41672	Capacitor foil	100 nF ±10%	63 V
C105	4822 122 31061	Capacitor ceramic	18 pF ±2%	100 V
C106	4822 122 30034	Capacitor ceramic	470 pF ±2%	100 V
C107	4822 122 31414	Capacitor ceramic	10 nF	100 V
C108	4822 124 20684	Capacitor electrolyt	470 µF ±50%	10 V
C109	4822 122 31414	Capacitor ceramic	10 nF	100 V
C110	4822 122 30094	Capacitor ceramic	220 pF	100 V
IC101	5322 209 85819	Integr circuit VCO	MC4024P	
IC102	5322 209 85821	Integr circuit PLL	MC4044	
IC103	5322 209 85255	Integr circuit	SN74LS90N	
R101	5322 116 54426	Resistor metal film	121 ohm ±1%	0.4 W
R102	5322 116 54511	Resistor metal film	316 ohm ±1%	0.4 W
R103	5322 116 50536	Resistor metal film	464 ohm ±1%	0.4 W
R104 105	5322 116 50635	Resistor metal film	1.47 kohm ±1%	0.4 W
R106	5322 116 55535	Resistor metal film	1 Mohm ±1%	0.4 W
R107	5322 116 50452	Resistor metal film	10 ohm ±1%	0.4 W
R108	5322 116 50536	Resistor metal film	464 ohm ±1%	0.4 W
R109	5322 116 50459	Resistor metal film	422 ohm ±1%	0.4 W
R110	5322 116 50579	Resistor metal film	3.16 kohm ±1%	1/8 W
R111	4822 116 51233	Resistor metal film	681 ohm ±0.5%	0.4 W
R112	4822 116 51235	Resistor metal film	1k ±0.5%	0.4 W
R113	4822 116 51233	Resistor metal film	681 ohm ±0.5%	0.4 W
TS101 102	5322 130 44845	Transistor	2N5771	
TS103	5322 130 44435	Transistor	2N5770	
TS104 105	4822 130 40937	Transistor	BC548B	

Pos. No	Order No	Description
	5322 218 70079	Mounting kit*
	5322 263 50101	Jumper 2pol
	5322 242 74372	Crystal, 10 MHz
	5322 456 30016	Text plate
	5322 255 44125	IC socket

* The mounting kit consist of: Socket, screw, washer and identification label.

10. CIRCUIT DIAGRAM AND COMPONENT LAYOUT



MULTIPLIER x1, x2, x10
FOR PM 6670-SERIES
AND PM 6652-SERIES

BU103 BU104 INPUT

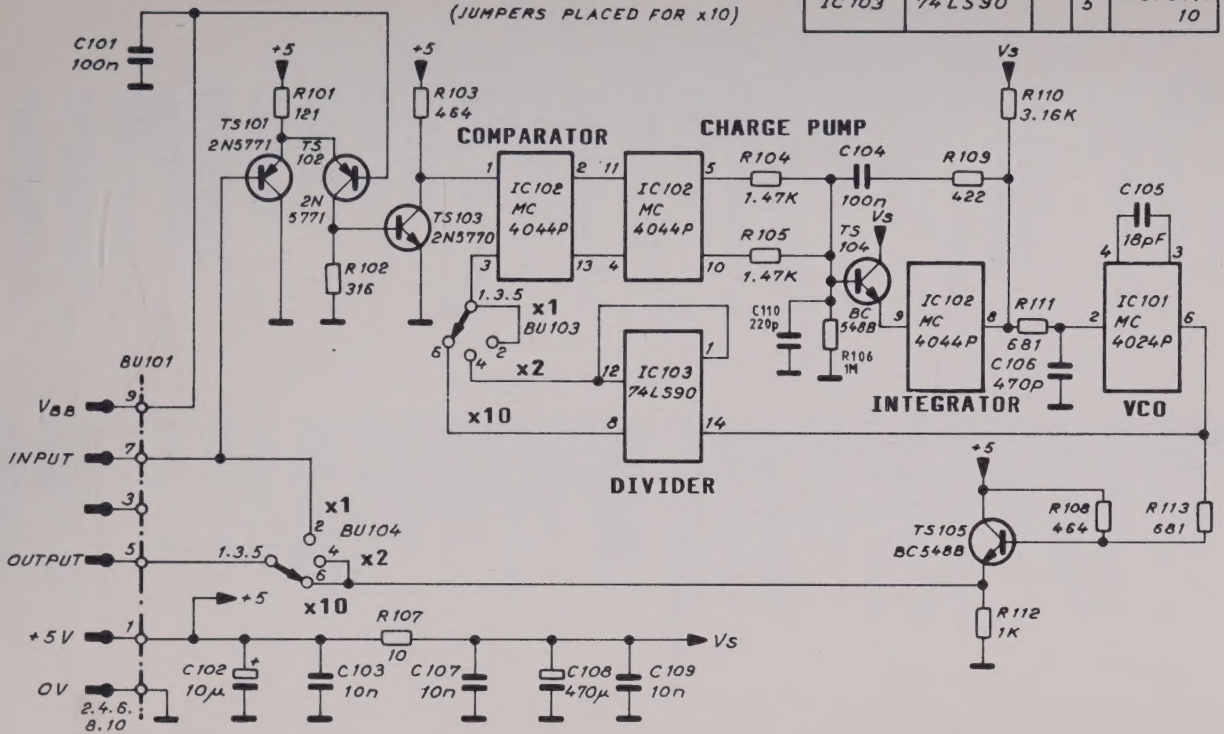
x1 10 MHz

x2 5 MHz

x10 1 MHz

(JUMPERS PLACED FOR x10)

		Vs	+5	GND
IC 101	MC 4024 P	1	14	5. 7. 9. 12
IC 102	MC 4044 P	14		7
IC 103	74 LS 90		5	2. 3. 6. 7. 10



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Venezuela: Industrias Venezolanas Philips S.A.,
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Zambia: Philips Electrical Zambia Ltd.,
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